

Analysing the distribution of marine mineral deposits across European Seas: A new perspective from the EMODnet-Geology project

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The EMODnet Geology project outputs, comprising standardised marine geology maps and information for all European Sea basins, provide a fresh geological overview. This new database enables the first systematic analysis of marine mineral records within Europe's maritime jurisdiction. Known occurrences of polymetallic marine minerals, as well as placer deposits form the basis of this study. The distribution and genesis of several marine mineral types have been mapped and analysed across varied geological environments.

Placer deposits are generally restricted to shallow waters of the continental shelf in close relationship with Variscan rocks and onshore drainage patterns. Placers of zircon, garnet, cassiterite, gold and magnetite are found in the Atlantic Iberian Peninsula, whereas ilmenite and rutile concentrations have been reported in the Mediterranean Sea and in the southern Baltic Sea. Most concentrations of ferromanganese crusts occur at 800 to 4000 m water depth over Cretaceous seamounts rising from the deep Atlantic basin. These crusts have also been found covering younger Miocene volcanic ridges at 900-1600 m water depth in the Mediterranean. In contrast to onshore deposit assays, both types exhibit outstanding high contents of Co, Mn, Ni, Pt, Te and rare earth elements. In the Atlantic Iberian margin, these ferromanganese crusts are accompanied by phosphorite slabs and pebbles. Ferromanganese nodules have been discovered over seamounts in the Bay of Biscay and Galicia margin and in contourite channels in the Gulf of Cádiz (Atlantic Ocean). Ferromanganese nodules and concretions are also widely distributed in the Baltic continental shelf. Finally, polymetallic sulphides associated with hydrothermal fields in the mid-Atlantic ridge (Azores Islands and Iceland) and volcanic features (Canary Islands, Norway) have been mapped. They contain strategic and critical metals as Co, Ba, Te, Cu, Ag, Au, In, Bi, Ga and Ge and hold very specific and unique fauna.