

Marine manganese deposits: Status, subjects, and perspectives.

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Marine manganese deposits, for example, crusts and nodules, occur mainly on the deep floors below the depth about 1000 meters. The deposits are noted as probable metallic ores for some useful metal elements. The distribution patterns, mechanism of formation and deposition, are recently intensively studied around the Japanese Islands in the Northwestern Pacific ocean. In this paper, the history of geoscientific study and resource exploration will be reviewed, in various aspects of geology, geochemistry, mineralogy, microbiology, and paleoceanography. The most important scopes of study on marine manganese deposits are, 1) chemical and mineralogical forms of manganese minerals, 2) mode and processes of deposition of useful metallic elements, 3) relationship of deposition of manganese oxides to marine geology, hydrological conditions, 4) characterization as nano material, 5) microbial effects on the deposition of manganese minerals, 6) correlation with terrestrial manganese and iron/manganese oxide deposits. A systematic joint scientific programs should be reactivated to reveal the real occurrence of the deposits, using modern high-tech vehicle, sensors, analysis apparatus of fine, fast, and high-resolution. In the paper, recent results will be overviewed based on our cruises and analysis with joint collaboration with domestic and international institutions

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