

SEG 2023 Conference: Resourcing the Green Transition

Re-Assessing the Resource Potential of Sea-floor Massive Sulfide Deposits

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Metal-rich deposits that form on the modern ocean floor, including sea-floor massive sulfide (SMS) deposits, manganese nodules, and cobalt-rich crusts, are considered by many to be a future resource to satisfy the growing metal demand for the green economy transition. An understanding of the resource potential of the sea floor, including the distribution of deposits and deposit sizes and grades, is required to assess whether marine minerals are indeed a viable future source for metals. However, compared to traditional land-based exploration techniques, the logistical and technological challenges associated with deep-sea mineral exploration, combined with the uncertainty with respect to the environmental impacts of sea-floor mining, remain an obstacle to fully understanding the potential for deep-sea mining to significantly impact global metal supply. Resource uncertainty also limits our ability to develop effective policy to regulate this emerging industry.

In 2011, we produced the first ever resource assessment for hydrothermally derived SMS deposits, in which a modest ~600 Mt of massive sulfide deposition was predicted to occur along the global neovolcanic zones of ocean floor. In this presentation, we will discuss how our understanding of the resource potential has evolved after more than a decade of subsequent exploration off-axis. We will examine the rates of discovery, the development of new geological models for deposit genesis, and emerging exploration technology and approaches. We will provide a critical assessment of our understanding of how hydrothermal deposits are sampled and how deposit grades and tonnages are reported. The results of this re-assessment of the global resource potential of SMS deposits will provide insights into the potential for these deposits to contribute to society's pursuit of new mineral resources for the green economy.