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# Inactive Seafloor Massive Sulfide Deposits – A significant future source for metals?

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Seafloor massive sulfide (SMS) deposits, which form at sites of high-temperature hydrothermal venting, are potential future sources for Cu, Zn, Pb, Au, and Ag. Our understanding of the resource potential for SMS deposits, based on their distribution, composition, and size, is biased towards actively venting systems located within the neovolcanic zones along submarine plate tectonic boundaries[1]. Current draft frameworks suggest that mining of actively venting sites in international waters will be prohibited[2], although conversely, all existing leases and contracts are centered around active vents[3][4]. Inactive SMS deposits, where venting has ceased, are an alternative exploration target. However, inactive deposits present several unique challenges, relative to active deposits, for exploration and resource assessments. The primary challenge is our ability to locate inactive deposits, because, unlike active deposits, they lack a hydrothermal plume, which is the primary vectoring signal for SMS deposits, and potentially occur across broader areas than narrow seams of neovolcanic zones. As a result, our understanding of the distribution of inactive deposits remains nascent. In addition, oxidation, dissolution, and recrystallization gradually alter the mineralogy and bulk composition of inactive deposits, with the potential to modify the abundances of contained metals in ways that are currently unconstrained.

In this talk, we will present the state of knowledge regarding the current understanding of the resource potential for inactive SMS deposits. We will discuss distribution and exploration perspectives, temporal evolution of inactive deposits, and preservation. We will include case studies from various inactive deposits in different tectonic settings, and results of detailed mineralogical and geochemical studies of weathering of hydrothermal material at the seafloor. Our conclusions will highlight the dearth of knowledge on this topic, and outline future research directions that will be critical to our understanding of the resource potential for inactive SMS deposits.

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