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Hydrothermal processes in the Edmond deposits, slow- to intermediate-spreading Central Indian Ridge

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ABSTRACT

The Edmond hydrothermal field, located on the Central Indian Ridge (CIR), has a distinct mineralization history owing to its unique magmatic, tectonic, and alteration processes. Here, we report the detailed mineralogical and geochemical characteristics of hydrothermal metal sulfides recovered from this area. Based on the mineralogical investigations, the Edmond hydrothermal deposits comprise of high-temperature Fe-rich massive sulfides, medium-temperature Zn-rich sulfide chimney and low-temperature Ca-rich sulfate mineral assemblages. According to these compositions, three distinctive mineralization stages have been identified: (1) low-temperature consisting largely of anhydrite and pyrite/marcasite; (2) medium-high temperature distinguished by the mineral assemblage of pyrite, sphalerite and chalcopyrite; and (3) low-temperature stage characterized by the mineral assemblage of colloidal pyrite/marcasite, barite, quartz, anglesite. Several lines of evidence suggest that the sulfides were influenced by pervasive low-temperature diffuse flows in this area. The hydrothermal deposits are relatively