

Are seafloor massive sulfides a modern analogue for VMS deposits ?

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Seafloor massive sulfides recognized in hydrothermal fields in arc-backarc settings in the western Pacific are commonly represented by coexisting occurrence of zinc- and lead-enriched polymetallic sulfides and abundant sulfate minerals. The mineralogy and geochemical signatures present has led researchers to suggest these areas may be a modern analogue for the formation of ancient Kuroko-type volcanogenic massive sulfide (VMS) deposits. Seafloor drilling during IODP (Integrated Ocean Drilling Program) Expedition 331 documented the subseafloor hydrothermal system at the Iheya North Knoll in the Okinawa Trough. Mineral textures and assemblages present in the drilled cores obtained from a hydrothermal mound in the proximal area were consistent with those recognized in ancient Kuroko-type mineralization. Moreover, stratabound occurrences of base-metal mineralization and widespread hydrothermal alteration were recognized across an area of over 500 m extent, which are comparable to ancient Kuroko-type deposits. On the other hand, geochemical studies of hydrothermal fluid venting from the seafloor and pore fluid within the sediment demonstrated diverse range of sulfide and sulfate mineralization could be related to subseafloor geochemical processes and fluid flows. Geochemical studies on present seafloor hydrothermal activities would provide a rare window into the dynamic processes for formation of VMS deposits.