Geochemsitry of sulfide chimney samples recovered from Southwest Indian Ridge (SWIR)

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Sea-floor massive sulphides are deposits of metal-bearing minerals that form on and below the seabed as a consequence of the interaction of seawater with a heat source (magma) in the sub-sea-floor region. The chemical reactions that take place while seawater percolates through the fissures and cracks in the ocean floor result in the emission of fluids, that is hot, slightly acidic, reduced and enriched in dissolved metals and sulphur, through hydrothermal vents on the ocean floor. These vent results in actively forming massive sulphide deposits rich in metals and minerals.

Very few investigations have been made so far in ultra-slow spreading South West Indian Ridge (SWIR) on the hydrothermal activities. Analysis of CTD data from 63^0 34' E revealed presence of potential temperature and salinity anomalies in one location, where grab sampling operations yielded sulphide chimney fragments. This paper presents preliminary geochemical results of these sulphide chimney samples, thus enabling to understand the metal content and nature of hydrothermal fluid in the region. Preliminary data shows enrichment of Cobalt, Copper, Zinc and Gold. Concentration of Co, Cu, Zn and Au sulphides is ~ 0.3 %, 2 %, and 350 ppm and 500 ppm respectively. The REE geochemistry of metalliferous sulfides is generally considered as an indicator for the source and evolution processes of hydrothermal fluids. The chondrite-normalized patterns show LREEs enrichment over HREE with weakly negative Eu anomalies. Under the high temperature conditions in the hydrothermal fluids, the larger ion radius of Eu^{2+}(1.09) compared with Eu^{3+} (0.95) and the other trivalent REEs will restrict its entry into the precipitating sulfide crystals. This might attribute to the distinct mineralization environment and fluid compositions in this area.

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