

Mineralogical, Geochemical, and Sulfur Isotopes Studies of the Partolang Volcanogenic Massive Sulfide Deposit, Wetar Island, Indonesia

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Wetar Island is part of the Sunda Banda arc. Its stratigraphy consists of Neogene volcanic and marine sedimentary rocks hosting polymetallic volcanogenic massive sulfide (VMS) deposits. The Partolang VMS deposit is located ~5 km east of the Kali Kuning deposit, and its characteristics and process of ore formation are remains less studied compared to nearby deposits. This study reports mineralogy, geochemistry, and sulfur isotopes characteristics of the Partolang deposit.

An ore horizon of the Partolang deposit is bounded by footwall and hanging-wall rocks. The footwall consists of rhyodacite lava, while the hanging-wall consists of andesitic pyroclastic breccia and dacite lava. The rhyodacite and dacite lavas exhibit calc-alkaline affinity, while the andesitic pyroclastic breccia is transitional between tholeiitic and calc-alkaline affinities. The rhyodacite and dacite lavas sourced from a continental arc setting, while andesitic pyroclastic breccia from a transitional oceanic-continental arc setting. Alteration of the host rocks includes silicification, advanced argillic, argillic, and propylitic alteration.

Mineralization occurred in at least four stages: (1) early stage pyrite with minor chalcopyrite-bornite and trace sphalerite-galena, (2) main stage pyrite-enargite-tennantite-tetrahedrite with minor chalcopyrite-marcasite and trace sphalerite-galena, (3) late stage pyrite-marcasite with minor covellite-chalcocite-enargite-tennantite-tetrahedrite, and (4) supergene chalcocite-covellite-jarosite. Copper, lead, and zinc concentrations of ores suggest that the deposit is a bimodal-mafic type VMS deposit. Pyrite-I is collomorphic, vuggy, and zoned (avg. 0.9 wt.% As, 0.4 wt.% Cu), while Pyrite-II is euhedral and massive (0.1 wt.% As, 0.1 wt.% Cu). $\delta^{34}\text{S}$ values of sulfides in siliceous ores, brecciated sulfide ores, and massive sulfide ores narrowly range from 9.3 to 9.7 ‰, 7.9 to 8.0 ‰, and 7.9 to 8.1 ‰, respectively. A sample of barite from a brecciated sulfide ore yielded a $\delta^{34}\text{S}$ value of 21.2 ‰.