Characteristics and Age Spatial Distribution of Gold Deposits in Western Java and Their Exploration Implications

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Western Java is part of Sunda Banda magmatic belt. There are three groups of magmatic-volcanic events along this zone that include Eocene-early Miocene, Mio-Pliocene, and Quaternary ages. The composition of those magmatic events is quite similar (basaltic andesite with acidic-intermediate intrusives). Country gold production came mostly from this belt, from locations such as the former Cikotok-Cirotan and Cikidang mines and the Pongkor and Cibaliung active gold mines.

The gold deposits are largely in the form of gold-bearing quartz veins that are classified as epithermal low sulfidation, intermediate sulfidation, and high sulfidation. The low sulfidation epithermal system is characterized by metal content of gold and silver associated with adularia and manganese oxide (± sericite and carbonate), while intermediate sulfidation is characterized by cockade breccia texture and polymetallic mineral contents, mainly gold and silver, and significant chalcopyrite, lead, zinc, and rare bismuth, wolframite, cassiterite, and tellurium minerals contents. The high sulfidation, porphyry-related system is characterized by massive vuggy quartz texture and diorite intrusion and gold associated with enargite-tennantite-molybdenite.

The Pb, S, and C isotope ratios indicate the magmatic source for associated metals, while the association of tin minerals, wolframite, and bismuth minerals suggests the recycling of older continental crust underlying the Malaysia-Sumatra porphyry tin belt as the source of the metals. The oxygen stable isotope ratio suggests a mixing of hydrothermal fluids with meteoric water in the ore depositions.

The mineralization ages obtained from K-Ar and Ar/Ar dating indicated a shifting of the volcanic front in Java Island, clearly shown from mineralization ages of the Cikidang (2.4 Ma), Cirotan (1.7 Ma), Pongkor (2.7 Ma), Arinem (8.8–9.4 Ma), Cineam-Citambal (8.5 Ma), and Cibaliung (11 Ma). The time-spatial change of hydrothermal activity with gold mineralization corresponds to magmatic activity in the Sunda-Banda magmatic arc, which was caused by subduction of the oceanic plate under the continental crust. The crust is relatively thin and young with mostly intermediate composition accompanying a few ignimbrite deposits.

Most of the known gold deposits in Western Java are associated with the Mio-Pliocene magmatic volcanic group. Therefore, exploration efforts should be concentrated along this magmatic zone, and, if possible, the deeper part should be targeted to locate the possibility of high sulfidation, porphyry-related gold deposits.