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Research Advances

# Geological Features, Mineralization Types and Metallogenic Setting of the Phlaythong Large Iron Deposit, Southern Laos

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The Phlaythong large iron deposit in Shampasak of southern Laos, is located in the Kon Tum microblock (Fig. 1A), central-southern part of the Indo-China block, and the geographic coordinate of the central mining area is 14°43′ 04″ N and 106°07′02″ E. Intensive tectonic and magmatic activities of multiple periods developed in this region, especially in Mesozoic and Cenozoic, which are closely related to the formation of abundant mineral resources. The mineralization of Phlaythong iron deposit is related to the formation of Mesozoic bimodal volcanic rocks and the outpouring of Cenozoic basaltic magma, with a reserve of about 150 Mt Fe.

The Triassic bimodal volcanic rocks crop out in the eastern part of the deposit (Fig. 1B), comprising massive basalts and rhyolites, with the development of columnar joints in the basalts. The basalt and rhyolite samples from the bimodal volcanic rocks yield SHRIMP zircon U-Pb ages of 226.0 ± 3.0 Ma and 229.0 ± 2.0 Ma, respectively. The basalts have average $SiO_2$ of 50.70 wt%, high contents of $TiO_2$, MgO, CaO and TFe, and low contents of alkalis and $P_2O_5$. They are enriched in LILE (Sr, Rb, Ba and Th) and light rare earth elements, and slightly depleted

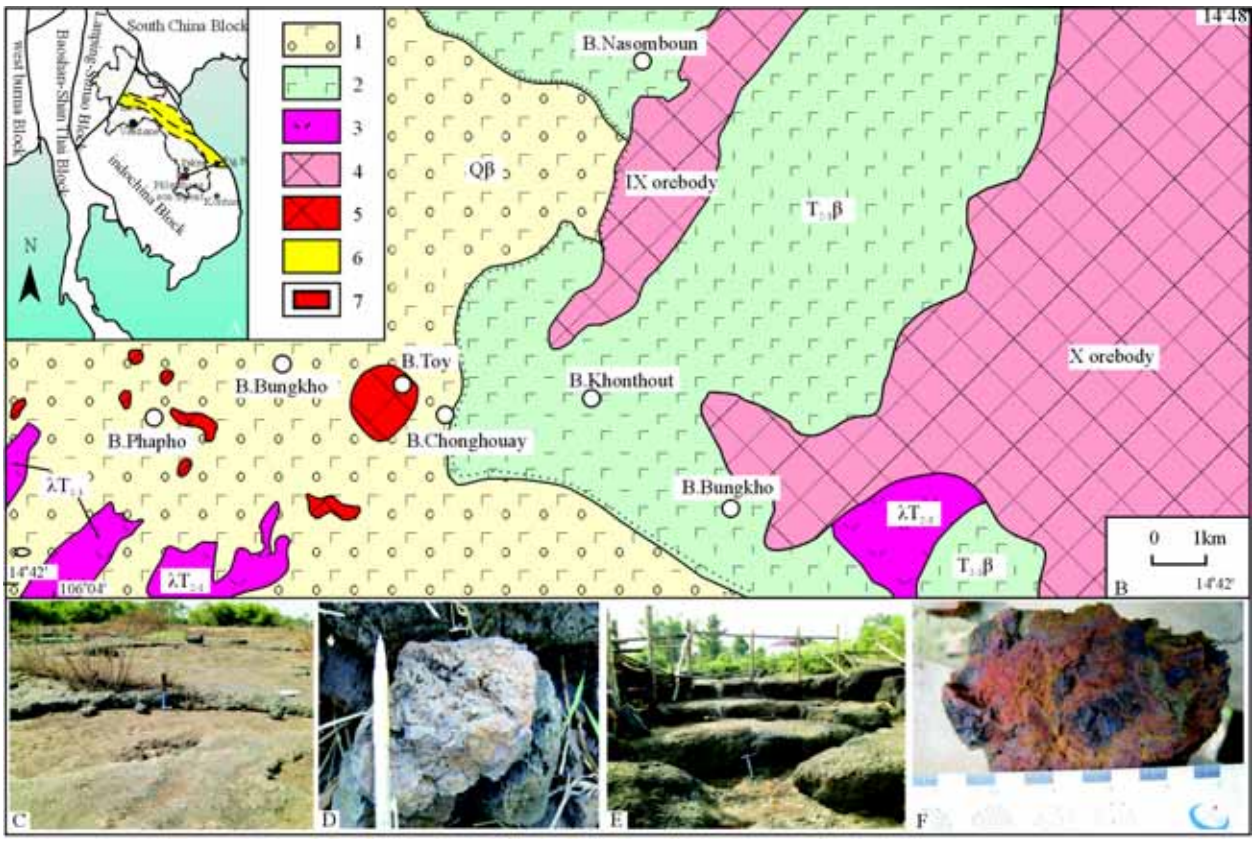


Fig. 1. Simplified geological map of the Phlaythong iron deposit in southern Laos.
1, Quaternary vesiculate basalts; 2, Triassic massive pyroxene basalts; 3, Triassic rhyolite; 4, Brecciated hematite orebady; 5, Rnodular magnetite orebady; 6, Truong Son Terrane ; 7, Work area.

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in HFSE, with unconspicuous negative Eu anomaly. The rhyolites are characterized by high contents of $SiO_2$ (av. 76.33 wt%) and alkalis, and significant low contents of $TiO_2$, MgO, CaO and TFe; and they are obviously depleted in Ta, Nb, Ba, Sr and Ti, enriched in light rare earth elements, with significant negative Eu anomaly (δEu=0.31–0.82). The bimodal volcanic rocks formed in a within-plate rift tectonic environment. Some Quaternary vesiculate basalts and amygdaloidal pyroxene basalts crop out in the western part of the deposit (Fig. 1B), with the development of ropy structure.

Two types of iron mineralization in the Phlaythong deposit were identified: rich ores with nodular magnetite mineralization (Fig.1C), and poor brecciated ores with hematite mineralization (Fig.1E). Eleven orebodies have been delineated, with bedded shape and widely exposed on the surface. The hematite mineralization mainly developed in the eastern part of the deposit, and the largest orebody (Number X) is SN-striking, about 12 km long and 7 km wide, with thicknesses ranging from 1 to 5 m. The magnetite mineralization mainly developed in the western part of the deposit, and the orebodies are 0.5−3 m thick (av. 1.94 m), with length and width of 100–1000 m.

The hematite ores are brecciated, and the cement compositions are mainly argillaceous-arenaceous, ferruginous, and tuffaceous(Fig.1F), with TFe content of 20%–45% (av. 38.20%). The magnetite ores have a nodular texture and a massive structure (Fig1.D), with average TFe of 56.40%, which is much higher than the hematite ores.

Our research suggests that, the hematite mineralization in the eastern part of the deposit is of volcanic-sedimentary origin, related to the Indosinian bimodal volcanic rocks. The basalts and rhyolites formed in the early stage of the volcanic eruption in Triassic, and Fe-rich pyroclastic rocks formed later. Then, the ferruginous materials were extracted from these volcanic rocks and transported by the meteoric water; and cemented the breccia to form the brecciated hematite ores, covering on the Indosinian bimodal volcanic rocks. The magnetite mineralization in the western part of the deposit is the volcanic lava-type mineralization, formed by the outpouring of ferruginous basaltic magma. In Cenozoic, the vesiculate basalts formed earlier by differentiation of the basaltic magma; subsequently, the ferruginous magma outpoured to the surface to form the magnetite mineralization.

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