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Research on the metallogeny and exploration potential of the Guilaizhuang goldfield, western Shandong

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The Guilaizhuang goldfield is located along the southeastern edge of the North China Craton, west of the Tanlu fault zone, and in an area bordered by the Nishan uplift and Pingyi depression in the southern Luxi block. The regional strata mainly consist of the metamorphic rocks of the Shancaoyu Formation (Neoarchean Taishan Group), Cambrian and Ordovician carbonate and clastic rocks, and Jurassic-Cretaceous clastic and volcanic rocks. During middle Mesozoic Yanshanian orogeny, monzodioritic and monzosyenitic magmatism was common in this area, as was abundant regional faulting. SHRIMP U-Pb zircon dating of the intrusive rocks shows an isotopic age of 176.0±1.1 Ma.

Numerous previous studies have examined the metallogeny of the Guilaizhuang gold deposit in western Shandong. Different genetic views have related ore formation to alkaline subvolcanic magmatic activity and doming, fluid flow along a transcrustal fault system, and regional extensional tectonics. The basic characteristics of mineralization can be summarized as follows: ① The gold deposit is mainly controlled by the Yangan fault and its associated branching faults. The early Yanshanian subvolcanic complex provided abundant heat and an ore-forming fluid, as well as providing a favorable space for ore deposition. The Cambrian and Ordovician carbonate rock is the main host rock. ② The ore deposits are mainly breccia type and magnesian-rich carbonate replacement type. The wall-rock alteration is mainly fluoritization and silicification, which are closely associated with the gold deposit, as well as associated pyrite and tellurides. Gold, Ag, and Te are the main ore commodities, and the ores are particularly rich in tellurium and poor in sulfur, which is a unique feature of the gold deposits in this area. ③ The deposit formed in the early Yanshanian at temperatures of 120 to 250℃, which is characteristic of such epithermal deposits. ④ The ore-forming materials have deep and local wall-rock sources. In addition, the ore-forming fluid was a mixed, deeply sourced hydrothermal solution and surface water.

The Guilaizhuang goldfield in western Shandong has favorable ore-forming geological conditions, a large mineral resource, and a significant exploration potential. The cryptoexplosion breccia type and carbonate layered disseminated type of ores, particularly the small and high-grade Zhuojiazhuang type gold deposits are targets for further exploration. The important area for exploration targeting should be the main subvolcanic complex center's outer zone, particularly in the north-central part of the Guilaizhuang-Shizizhuang-Zhuojiazhuang belt. This belt is a structurally anomalous zone that coincides with magnetic, electrical, and remote sensing anomalies, as well as a significant geochemical anomaly, so it may be an important area for discovery of future intrusive breccia type gold deposits.