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Metallogenetic setting and processes of gold, antimony, and arsenic deposition, SW Guizhou, China

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The mineralization events forming widespread gold and antimony deposits, as well as the regional crustal extension, were probably contemporaneous during the middle to late Yanshanian Period in southwestern Guizhou Province, China. Deeply concealed acid-intermediate intrusive bodies may have been the source of the ore-forming material and fluids for the mineralization in this area. The water-rock reactions between the original ore-transporting fluids and the ore-hosting country rocks changed the physical and chemical conditions of fluids resulting in boiling of fluids. The boiling caused immiscibility of fluids and resulted in gold precipitation in arsenian pyrite and arsenopyrite. Meanwhile, the rapid loss of sulfur lead to an abundance of remaining As, Sb, and other ore-related elements in the fluids. Arsenic and antimony formed dissolved arsenic-antimony complexes with atomic ratios of 3:1. Lower fluid temperatures caused by migration of the fluid to the shallower crust, and subsequent mixing with meteoric water, likely lead to further immiscibility of the fluid. This caused the separation of arsenic and antimony and eventually formed deposits of these commodities. The two unmixed fluid systems, one rich in arsenic and one in antimony, migrated in different directions and continuously mixed with meteoric water, which further reduced the fluid temperature, leading to the deposition of arsenic- and antimony-bearing minerals.