The Formation of Auriferous Jasperoid Under the Control of Multi-Stage Tectonism at Tavsan, Kutahya, Western Turkey

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The collision of the Anatolide-Tauride Block with the Pontides along the Izmir-Ankara Suture Zone following the closure of the northern Neo-Tethys, and the extensive obduction of ophiolites between the Late Palaeocene and Early Eocene, is associated with several periods of magmatism and related hydrothermal mineralisation in the region of the Tavsan deposit.

This region contains several mineral deposits with varying metal endowments closely linked to host lithology and tectonism. To determine the genesis of these deposits, an integrated field study coupled with other disciplines of mineral exploration are used at the Tavsan deposit, in which Au, Sb-Au, and Sb mineralisation is identified.

Field observations and microscopic analyses define the relationships between lithological units, structures, and alteration zones at Tavsan. The presence of macrostructures (particularly faults and folds) and combined stress analyses indicate significant structural controls on dispersion of hydrothermal fluids, marked by the presence of silicification, quartz veins, and hydrothermal breccias. Microscopic studies distinguish the relationship between alteration zones and the auriferous jasperoid, and their precursors associated with ultramafic rocks and limestone units. Electron probe micro-analyser studies show that gold is localised with disseminated pyrite minerals within jasperoid after hydrothermal silicification and de-carbonatisation of host rocks.

The Tavsan deposit is morphologically controlled by thrust faults and their partial re-activation under a later extensional regime, which followed peak compression during the Eocene. The spatial zonation of metallic associations and variability in sources of ore-forming fluids indicate that Sb-Au deposition occurred as a consequence of a hydrothermal system developed in a post-collisional setting. Genetic links between these deposits, regional magmatism, and extensional fault systems controlling the distribution of mineralisation suggest a Miocene age for formation of the main gold deposit.

This study emphasises that direct or indirect integration of diverse exploration methods can enhance understanding of relationships between tectonic processes and mineralisation.