VOLCANIC FRAMEWORK OF THE EL DORADO GOLD DISTRICT, EL SALVADOR: CONSTRAINTS BY RECENT FIELD MAPPING AND DETAILED ARGON GEOCHRONOLOGY

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The El Dorado low-sulfidation epithermal Au-Ag vein system, located in northern El Salvador, formed is hosted in Tertiary volcanic and sub-volcanic rocks that accumulated along the Caribbean plate margin in response to the NE subduction of the Cocos plate. The volcanic basement rocks that host vein mineralization in the north and central parts of the district consist of a >400-meters-thick sequence of basaltic to andesitic lava flows and sedimentary rocks. Porphyritic basaltic to andesitic domes and dikes intruded this sequence during the late Miocene (10.7 ± 1.9 Ma; ^{40}Ar-^{39}Ar plateau age on plagioclase).

Vein formation in the district is poorly constrained between 4.7 ± 0.2 Ma and 4.06 ± 0.29 Ma (K-Ar and ^{40}Ar-^{39}Ar plateau ages on vein adularia), and preceded a period of widespread felsic volcanism (3.94 ± 0.29 Ma to 3.36 ± 0.49 Ma) based on argon geochronology of rhyolite flows, domes and related pyroclastic rocks that widely crop out in the southern part of the district. In the southwest area of the district, barren to gold anomalous sinters define the paleo-surface of the epithermal vein system, and are intercalated with felsic pyroclastic and sedimentary rocks at the base of the sequence. The onset of felsic volcanism thus appears to mark the waning stage of hydrothermal activity associated with vein formation and mineralization.

The current exposures from north to south in the El Dorado district appear to represent an oblique cross-section through the volcanic and hydrothermal system associated with the low-sulfidation epithermal vein system. North and Central El Dorado, dominant with mafic to intermediate volcanic basement rocks, represent the deeper parts of the volcanic and hydrothermal system. South El Dorado is clearly the shallow level of the epithermal veins system, preserving the surface and shallow sub-surface environments, including the sinters and contemporaneous to post-mineral felsic volcanic rocks. The distribution of volcanic facies along Titihuappa River, defining a east-striking regional fault zone on the extreme south, appears to define the northwestern margin of the Pliocene Rio Titihuappa basin, potentially representing a volcano-tectonic depression that formed during and/or following vein formation.

The Miocene to Pliocene transition in Central America is marked by a trenchward shift in subduction and associated magmatic activity (Weyl, 1980). The volcanic record preserved at El Dorado suggests that the Pliocene magmatic event led to the formation of compositionally evolved, mid- to upper-crustal magma chambers, responsible for felsic volcanic activity at the surface. These magma chambers potentially represented the critical heat engine to the once active hydrothermal system and a possible source of precious metals. Extensive eruptions associated with the evolving magma chamber during the period ~4-3.3 Ma potentially lead to caldera collapse and suppression of the near-surface hydrothermal activity.