Structural Model of the La Plata VHMS, in the Western Cordillera of Ecuador

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La Plata is a polymetallic, volcanic-hosted massive sulfide deposit (VHMS) dominated by masses of sphalerite, chalcopyrite, pyrite, and galena, with associated gold and silver mineralization, and bounded by quartz, sericite, and chlorite-pyrite alteration halos. The deposit is hosted by volcanic and volcano-sedimentary units of the Paleocene-Eocene Macuchi Unit in the Western Cordillera of Ecuador. The La Plata deposit is located within a 5-km-long and 250-m-wide north-south trending mineralized corridor controlled by dextral-reverse faults. It is affected by at least one tectonic deformation event, divided into two phases. The first phase developed in a dextral strike-slip regime, associated with asymmetric sigmoidal boudin structures generated by stretching in a ductile regime, accompanied by NE-SW dolerite intrusions, while the second phase exhibits a progressive deformation linked to the first phase with the generation of transverse transfer faults, compressional structures associated with duplex, fault-fold geometries, as well as andesitic and rhyodacite intrusions parallel to the fault zones. East-west sinistral and northeast-southwest dextral transfer faults separate the corridor into five structural blocks, from south to north: La Mina Sur, La Mina Norte, Quebrada Tajo, Guatuza, and San José. This study presents a structural model of the La Plata deposit using the implicit modeling method in Leapfrog Geo. The model integrates lithological, geochemical, and structural information collected on terrain and subsurface. The project comprises 1,079 mapping points, 77 trenches, and 127 drill holes drilled from 1996 to 2017 and defines the geometry, distribution, and spatial orientation of the host units, ore zone, and primary and secondary structural surfaces. The resulting model will be useful for the estimation of the mineral resource at La Plata.